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山东始新世原始貘形类*

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不久以前，我們曾发表过一个簡报，提到在山东昌乐发現的貘形类(包括貘和犀类)的最早祖先——始祖貘（*Homogalax*）——的一种化石（Chow & Li, 1963)。1964年夏，本文后一作者又与李玉清、张宏等同志赴昌乐五图发現始祖貘的地点从事采集，希获得更多的标本和对化石层的层位作进一步的确定。由于五图盆地老第三系的出露面积有限，化石极少，故收获不大。但在此次野外工作中，在邻接的临朐境內牛山附近，与五图层位相近的始新統中找到了另一种原始的貘形类——犀貘（*Heptodon*）的化石。

昌乐五图和临朐牛山这两个属的化石在我国第三紀哺乳类和地层的研究上有重要的意义。这两属都是早始新世的最原始的貘形类。它們的化石过去仅限于北美西部的下始新統，而且分别被認为是确定下始新統下部和中、上部层位的标准属。*Homogalax* 目前一般公認是現知时代最早和最原始的貘形类，是后来所有貘类的共同祖先。*Heptodon* 在北美分布的时代为早始新世的中、后期。它比 *Homogalax* 較进步，在系統上与后者相衔接，并代表从貘类到犀类的过渡类型，因此，在形态上与最原始的犀类——貘犀（*Hyrachyus*）也十分近似。

五图和牛山产化石地层的确定层位还不十分清楚。在五图同一层位发現的其他化石只有一个鈍脚类的門齿，无法作为确定时代的参考。另外，楊鍾健于1961年描述了一种采自較始祖貘层可能略低的油頁岩层中的蜥蜴化石——五图昌乐蜥（*Changlosaurus wutuensis* Young），时代初步确定为晚始新世或早漸新世。今始祖貘的发現，可以为五图組提供更为可靠的时代証据。*Homogalax wutuensis*（新种）与北美的十分接近，虽有一些形态上的細微差别也沒有层位学上的意义。如前述，这一属在北美是下始新統的标准属，在我国虽然还是首次发現，但时代大致也相当。在临朐牛山的同一层位中，过去曾发現过一种鱉类（*Anosteira shantungensis* Cheng）化石，据研究者程政武(1961)的意見，时代可能是始新世晚期或漸新世初期。从这次同一层中发現的 *Heptodon* 化石看来，可以肯定"牛山段"的时代不会晚于中始新世，而很可能为早始新世的中晚期，化石层的层位稍高于昌乐五图的"五图組"。牛山的 *Heptodon* 与北美的种 *Heptodon posticus* 基本相同，可以認为是属于同一进化阶段的。这一屬的两个种在北美西部，根据大量的資料可以确定为下始新統的中、上段（Lysite 和 Lost Cabin）的化石。另外，在山东新泰时代較晚的地层（"官庄統"）中，我們也找到过較 *Heptodon* 更稍进步的中始新世的 *Helaletes* 属的化石，它显然是和牛山的种直接有关。

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标 本 描 述

Superfamily Tapiroidea Gill, 1872

Family Isectolophidae Peterson, 1919

Genus *Homogalax* Hay, 1899

五图始祖貘 *Homogalax wutuensis* sp. nov.

(图版 I, 图 1—2; 插图 1)

正型标本: 一右上頜骨、具 P^2—M^1(古脊椎动物与古人类研究所野外編号 62058、登录号 V. 2809)。

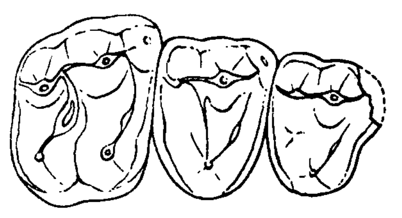


插图 1. 五图始祖貘 (*Homogalax wutuensis* sp. nov.)
右 P^3—M^1, 冠面视, ×2

其他标本: 一右下頜骨的后段, 具 M_2, M_3, 破碎的上、下臼齿各 1 个(登录号 V. 2809.1)。

地点及层位: 山东昌乐五图老旺沟; 五图組, "中煤层段"。

特征: 大小、結构与北美的 *Homogalax protapirinus* 相近, 但 P^3、P^4 較后者窄, P^4 的原小尖显著, P^3 的微弱, M^1 輪廓成斜方形。

描述及比較: P^3 輪廓近三角形, 有三尖; 前尖与后尖紧靠, 較后尖高大, 外壁較凸; 前附尖失落, 估計象 P^4 一样, 可能相当大; 原尖略低于前、后尖, 尖錐状, 具前后两脊; 原脊尖稜状, 較低, 自原尖伸向前附尖的內側基部, 原脊中部有一微弱的原小尖; 后脊纖弱, 极短, 自原尖向后外方伸出不远卽消逝, 使齿的后部自原脊后側起形成一寬闊的谷地; 齿緣仅在齿的前后两側发育, 后齿緣寬, 围繞着牙齿的整个后緣, 前齿緣較弱。

P^4 近方形, 牙齿較 *H. protapirinus* 的狹长; 前尖与后尖在頂端清楚地分开, 前尖較高, 外壁凸出; 前附尖极大, 由一沟与前尖隔开。原小尖显著, 与 *Hyracotherium* 的相似, 而較 *Homogalax* 某些有原小尖的标本的为大; 原脊和后脊較 P^3 的显著发育, 后脊自原尖伸至外脊, 近垂直地交于后尖的前內側, 原、后脊成 V 形交汇于原尖, 构成牙齿中部一封閉盆地; 前齿緣較 P^3 的显著。

M^1 后部較 *H. protapirinus* 的后边狹, 成斜方型, 与后者的 M^2 或 M^3 輪廓有些相似; M^1 为典型的 *Homogalax* 型牙齿: 四齿尖, 前、后尖近于等大, 較凸, 前附尖发育, 原、后脊完整, 成前外后內向傾斜, 两脊彼此平行、近于等长, 原小尖及后小尖显著。M^1 四边都有齿緣, 外側的最弱, 內側的強, 后齿緣不及前臼齿的显著。

下臼齿的形状与 *H. protapirinus* 的很相似。M_2 长方形, 四尖; 下原尖、下次尖的位置分別稍前于下后、下內两尖; 下原脊高于下次脊; 下前脊低, 退化成齿緣状, 自下原尖向內延伸, 包裹着齿的前緣; 下后脊纖弱, 自下次尖向前伸至下原尖的后基部; 下后尖的后內側有一紧貼的位置稍低的下后附尖; 下內尖的前側有一低弱的脊稜; 下次小尖較大, 位于齿的后緣中部; 齿緣沿外后两側发育, 較弱。

M_3 的結构与 M_2 基本相似, 唯牙齿更狹长, 在齿的后部通过唇側的下次小尖发育了

一脊，围繞着齿的后緣，形成一近于封閉的跟座盆地。

測量：見第 18 頁，下同。

Family Helaletidae Osborn, 1892

Genus *Heptodon* Cope, 1882

牛山犀貘 *Heptodon niushanensis* sp. nov.

（图版 I，图 3—4；插图 2）

正型标本：一左上頜骨，具 P^2—M^3；属于同一个体的右上頜骨，具 P^4—M^2；两个破碎的門齿及一些头骨碎片（野外編号 62057 (64)；登录号 V. 3048）。

其他标本：上乳齿 DP^2、DP^4 各一个（62057，V. 3048.1）。

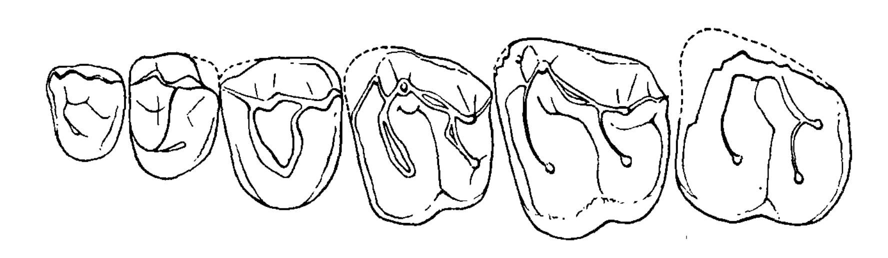


插图 2．牛山犀貘（*Heptodon niushanensis* sp. nov.）
左 P^2—M^3，冠面視，×1.5

地点及层位：山东临朐牛山朱壁店东沟；"牛山段"，灰綠色泥灰岩层；早始新世中晚期。

特征：大小与北美的 *Heptodon posticus* 相近，与后者不同处在頰齿稍狹，臼齿的次尖成錐状，原脊和后脊較斜，后脊較短，舌面的齿緣近于完整。

描述：P^2 較狹，近三角形；外壁有两个近于相等彼此靠近的主尖；前附尖小；原尖低；由原尖伸出的原脊以 50° 角向前斜交于外脊；具后齿緣、較弱。

P^3 与北美的 *H. posticus* 不同，后尖显著地大于前尖，外壁很凸，成粗鈍的錐形；前尖較后尖低，退化成附尖状，前后两尖清楚地分开；前附尖不显著；原尖低；原脊显著；后脊微弱，近于垂直地交于后尖的前內側；后齿緣发育。

P^4 近三角形，三尖；后尖最高大；前尖低，与后尖隔开；前附尖失落；原脊和后脊发育完整，两脊自原尖斜向外伸，围成齿中部的一封閉盆地；后齿緣寬，前齿緣显著。

M^1 略成方形，后緣稍狹；前附尖虽已破碎，但可以看出很大，与前尖分开；前尖最高，外壁凸出一条脊稜；后尖短，位置較前尖向內，外壁的稜弱；原脊及后脊較斜，后脊較短；次尖圓大，位置較原尖向外；前內两側齿緣发育，連續；外、后側齿緣微弱。

M^2 与 M^1 相似，唯較大，后尖和次尖更較显著。

M^3 后尖相当退化，短小，位置向內；后脊变短。

乳齿与北美的种属极为相似。DP^2 三角形，前尖高大，后尖极小。前附尖不显著；原尖低，有一低的原脊伸向前尖的前內側。

DP^4 方形，近臼齿化。前尖外壁凸，后尖者平，两尖等高，彼此分开；前附尖显著；原脊

及后脊較短，向前弯曲；次尖高于原尖，成錐状；內、后两側齿緣发育。

討論： *Heptodon niushanensis* 从它的个体較大、无小尖，P^3 有后脊等特点上，清楚地显示出比 *Homogalax* 的进步性质。从前臼齿无次尖，臼齿后尖較小、外壁不凸，向內移位和 M^3 的后脊較短、后尖退化等特点，使它也区别于 Isectolophidae 科的其他种属。可以肯定，牛山犀貘是 Helaletidae 科中相当于 *Heptodon* 阶段的化石。但它与北美的 *H. posticus* 等又有不同：牙齿較狹，后緣收縮，臼齿的原脊、后脊較斜和次尖成錐状。上述这些特点又在一定程度上与 *Homogalax wutuensis* 有些相似。因此，完全可以相信 *Heptodon niushanensis* 是由 *H. wutuensis* 直接进化而来，与北美的 *Homogalax* 关系較远。拉丁斯基（Radinsky, 1963, 頁 75, 77）鉴于北美的 *Heptodon* 突然出現于早始新世中期，找不到它的直接祖先，而与已知的 *Homogalax* 間的区别又很显著，因而推测 *Heptodon* 可能是由他处一未知的 *Homogalax* 种羣进化而来，于早始新世中期进入北美西部。山东的两属早期貘类化石的发現可能为拉氏的这种推論增添了一綫佐証。

測量（单位：毫米）（Measurements, in mm）

		Homogalax wutuensis	*Homogalax protapirinus*	*Heptodon niushanensis*	*Heptodon calciculus*	*Heptodon posticus*
P^2	L	—	7.72	8.0	6.52	7.70
	W	—	6.06	8.5	7.0	7.25
	I	—	128	94.2	118	106
P^3	L	7.8 ap.	8.34	8.2	7.8	8.9
	W	9.5	8.85	11.4	9.47	10.95
	I	82.2	94	72	90	81
P^4	L	8.0	8.75	12 ap.	8.37	9.35
	W	10.5	10.52	14 ap.	11.13	12.25
	I	76.1	83	85 ap.	85	76
M^1	L	10.4	9.92	13.0	9.99	13.8
	W	13.0	11.91	15.2	11.87	14.7
	I	80.0	83	85.6	88	94
M^2	L	—	10.71	15.1	11.51	14.90
	W	—	12.98	16.7	13.28	16.60
	I	—	83	90.6	88	90
M^3	L	—	10.74	15 ap.	11.59	14.50
	W	—	13.72	—	13.10	16.30
	I	—	78	—	86	89
		25.5 (P^3—M^1,L)		28.5 (P^2—P^4,L) 42.6(M^1—M^3,L)		

（*Homogalax protapirinus*, *Heptodon calciculus* 和 *H. posticus* 依 Radinsky, 1963, 頁 14, 36, 39, 101）。

L: 齿长(或齿长的均数)（length or mean length of the tooth）。

W: 齿宽(或齿宽的均数)（width or mean width of the tooth）。

I: 选取指数，即：$\frac{100 \times 齿长}{齿宽}$ $\left(\text{selected index of the tooth: } \frac{100 \times \text{length}}{\text{width}}\right)$。

ap.: 近似值（approaching value）。

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HOMOGALAX AND *HEPTODON* OF SHANTUNG

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In a short note published sometime ago by the writers (Chow and Li, 1963), announcement was made of the discovery of a fossil of *Homogalax* from the probable lower Eocene of Wutu in Changlo District, Shantung. A second trip to this locality was made in the summer of 1964. As the outcrops of Eocene beds in that locality are very limited in extent, and fossils extremely rare, only some lower molars of the same species and a few undeterminable pantodont remains were collected. During the same trip while the work at Wutu was rather fruitless, a new locality with a fossil of another tapiroid was located at Niushan, another small Early Tertiary basin in the neighbouring district of Linchu, at a horizon slightly higher than that of Wutu. This fossil turns out to be that of a *Heptodon,* quite similar to the North American form, too.

A description of these new fossils is given in the present notes. The writers are indebted to Dr. Leonard Radinsky in the identification of Wutu specimen, and to Miss K. C. Chi for the illustration.

Homogalax wutuensis **sp. nov.**

(Pl. I, figs. 1—2; text-fig. 1)

Type: Right maxilla with P^3-M^1 (V.2809). Referred specimens: Posterior of mandible with M_2, M_3 and isolated lower molar and an upper molar fragment (V.2809.1). Field no. 62058.

Locality and Horizon: Wutu, Changlo District, Shantung; middle part of Wutu formation, lower Eocene.

Diagnosis: Similar to *Homogalax protapirinus* in size and general structure of the teeth, but differs from the latter in having somewhat narrower P^3 and P^4, which bear a distinct protoconule, fairly prominent on P^4 and only inconspicuously marked on P^3; M^1 more trapezoidal in outline.

Description and comparison: P^3 roughly triangular in outline. Paracone and

metacone close to each other, but protocone with more convex external wall and more prominent. Parastyle lost, but seems to be quite large, as in P^4. A sharp ridge runs anteriorly from protocone down to the internal base of the parastyle, and with an indistinct protoconule anteriorly. The posterior ridge is much shorter and the posterior slope of the tooth is broader, bounded posteriorly by a strong cingular crest, which is interrupted lingually under the protocone.

P^4 more quadrate in outline, with paracone and metacone more distinctly separated at the summits. Both the protoloph and metaloph are well developed, and the parastyle strong and sharply demarcated from paracone. Proconule rather distinctly shown as in *Hyracotherium,* slightly more prominent than in some of the North American specimens of *Homogalax* which possess this structure. The metaloph is more or less joined to the ectoloph before metacone at a perpendicular line. The tooth is somewhat longer than that of the American form.

M^1 is typically *Homogalax*-like, but is more trapezoidal than the corresponding tooth in *H. protapirinus* and nearer to a M^2 or M^3 of the latter species in having narrow posterior side. The lingual cingulum is stronger.

The lower molars are essentially indistinguishable from those of *H. protapirinus*.

Measurements, see Chinese text p. 18.

Heptodon niushanensis sp. nov.

(Pl. I, fig. 3—4; text-fig. 2)

Type: A shattered skull, the parts saved for observation include some broken incisors and two maxillae with most of the upper cheek teeth (P^2-M^3). Field no. 62057 (64); cat. no. V.3048.

Locality and Horizon: East valley of Chupitian, Niushan, Linchü District, Shantung; marly beds of Niushan formation, Lower Eocene.

Diagnosis: A *Heptodon* of the size of *H. posticus,* differs from the North American form in having narrower cheek teeth, molars with conical hypocone, more inclined protoloph and metaloph, relatively shorter metaloph and nearly continuous lingual cingula.

Description: P^2 narrow and subtriangular, outer wall with two subequal main cusps close together and a small parastyle; protocone low and connected with the protoloph which form an angle of about 50 degrees with the ėctoloph.

P^3 metacone much larger than paracone which is small and style-like, protocone low and with a thin connecting ridge (metaloph) joining the metacone at its anterior base.

P^4 subtriangular and with three main cusps, of which the metacone is the largest and highest.

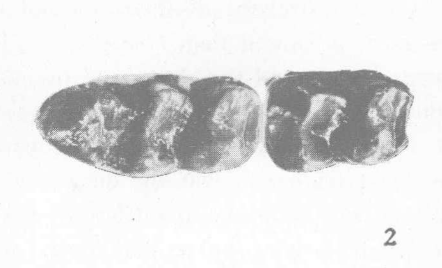
M^1 square-shaped, with slightly narrower posterior side; parastyle, though brocken, quite distinct and separate from paracone. Paracone pointed, rather labially placed, with steep external wall and a faint crista, and the external cingulum interrupted at its side. Metaloph shorter than protoloph; hypocone larger, conical and slightly labially placed than protocone.

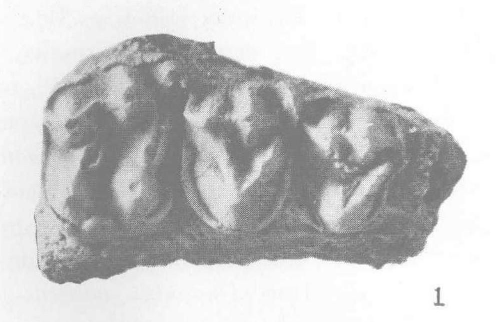
M^2 similar to M^1 except being of larger size and with more prominent metacone and hypocone. M^3 with metacone much reduced and more lingually placed.

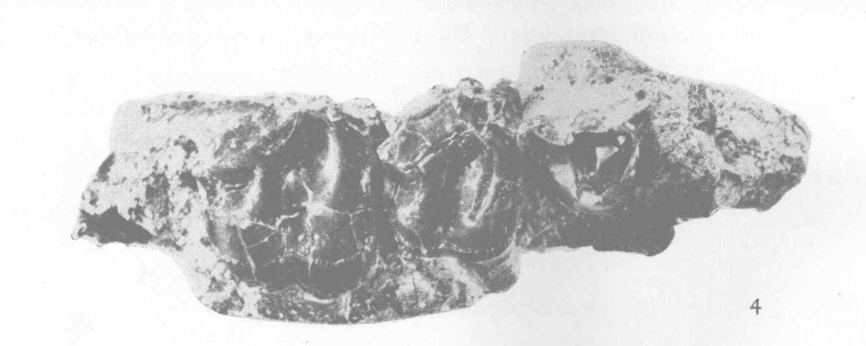
Deciduous molars: A. DP^2 and a DP^4 in the collection show same characters as

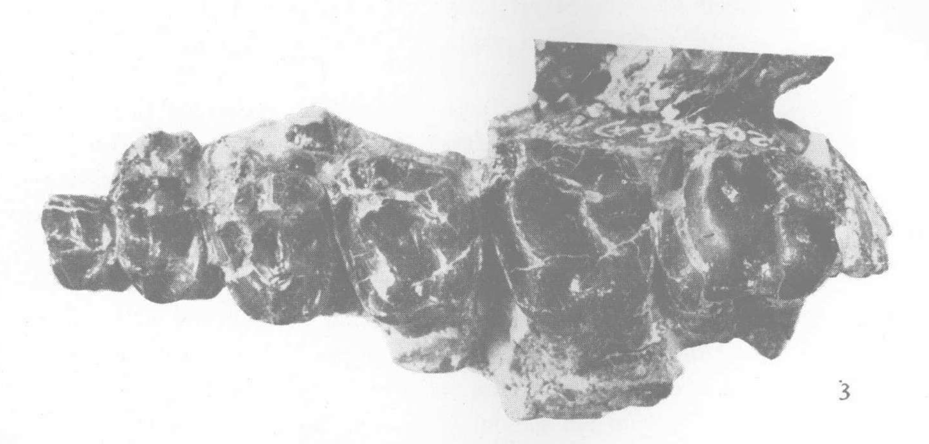
those described by Radinsky (1963, p. 31).

Remarks: This new Chinese species, with its larger size, the disappearance of the conules and presence of a metaloph on P^3, is much more advanced than *Homogalax*. The more quadrate outline of the molars and posterior premolars and the absence of premolar hypocone indicated that it follows *Heptodon* in the line of Helaletidae in cheek teeth evolution. Except being bigger, the absence of the proconules and proportionately longer, *Heptodon niushanensis* is so close to *Homogalax wutuensis* that the derivation of the one from the other seems to be certain. On the other hand, the new Chinese species differs decidedly from *Heptodon posticus* in having narrower premolars and molars with narrower posterior side, more oblique transverse lophs, and more conical hypocones. In his recent revision of the North American Tapiroidea, Radinsky (1963, p. 75 and p. 77) has suggested that the North American *Heptodon* might have evolved from an unknown *Homogalax* population elsewhere. The two forms here described may serve as a clue in supporting his hypothesis.









1—2. 五图始祖貘 (*Homogalax wutuensis* sp. nov.)

1. 右上颌骨，具 P^3—M^1 (V.2809)。
right maxilla with P^3—M^1 (V. 2809), ×2。

2. 左下第二、三臼齿 (V. 2809.1)。
left M_2 and M_3 (V. 2809.1), ×2。

3—4. 牛山犀貘 (*Heptodon niushanensis* sp. nov.)

3. 左上颌骨，具 P^2—M^3 (V. 3048)。
left maxilla with P^2—M^3 (V. 3048), ×1.5。

4. 右上颌骨，具 P^4—M^2 (V. 3048)。
right maxilla with P^4—M^2 (V.3048), ×1.5。